Increasing / Decreasing Functions

1. Show that the function $f(x) = x^3 - 3x^2 + 3x - 6$ is never decreasing.

2. Show that $y = x^3 + 6x + 2$ is always increasing.

3. Show that the function $f(x) = -x^3 + 9x^2 - 27x - 4$ is never increasing.

4. Find the interval in which $y = 2x^2 - 8x + 1$ is increasing.

5. Find the interval in which $y = 20x - 5x^2$ is decreasing.

6. Find the values of x for which $y = x^3 + 6x^2 - 36x$ is increasing.

7. Find the values of x for which $y = x^3 + 3x^2 - 9x + 1$ is decreasing.

8. Find the intervals in which the function $f(x) = x^3 - 6x^2 - 3$ is decreasing.

9. Find the intervals in which $y = 6x^2 - x^3$ is increasing.

10. Find the intervals in which $f(x) = -x^3 + 3x^2 + 72x - 1$ is decreasing.

11. Find the intervals in which $y = x^3 - 12x^2 + 5$ is increasing.

12. Find the intervals in which $f(x) = x^3 + 3x^2 - 24x - 5$ is increasing.